

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 3, 5-8 and 10 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species of the fuel distributor or of the baffle, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 10 April 2008.
2. Applicant's election with traverse of the distributor species of figures 5 and 6 and the baffle of a solid with a plurality of small orifices in the reply filed on 10 April 2008 is acknowledged. The traversal is on the ground(s) that all of the species as a group figures 2-9 are encompassed by the claims 1, 2, 4, 12 and 13. This is not found persuasive because with respect to the fuel distributor figures each of the species are mutually exclusive. Figure 2 has a fuel inlet from the side and the outlet chamber slopes. Figure 3 has two inlets and the outlet chamber is V-shaped. Figure 4 has an inlet from the top. In Figures 2-4, the baffle is outside the fuel cells. In Figures 5 and 6 the baffle is located within the fuel cells. Figures 7 and 8 include two adjacent manifolds with passages in the manifolds.

With respect to the baffles, grounds that all of the species as a group are encompassed in claims 1-14, this is not found persuasive because claim 13 does not contain a baffle.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Objections***

3. Claim 13 is objected to because of the following informalities: line 8 of claim 13 states "a inlet fuel inlet chamber." The first inlet should be deleted. Appropriate correction is required.

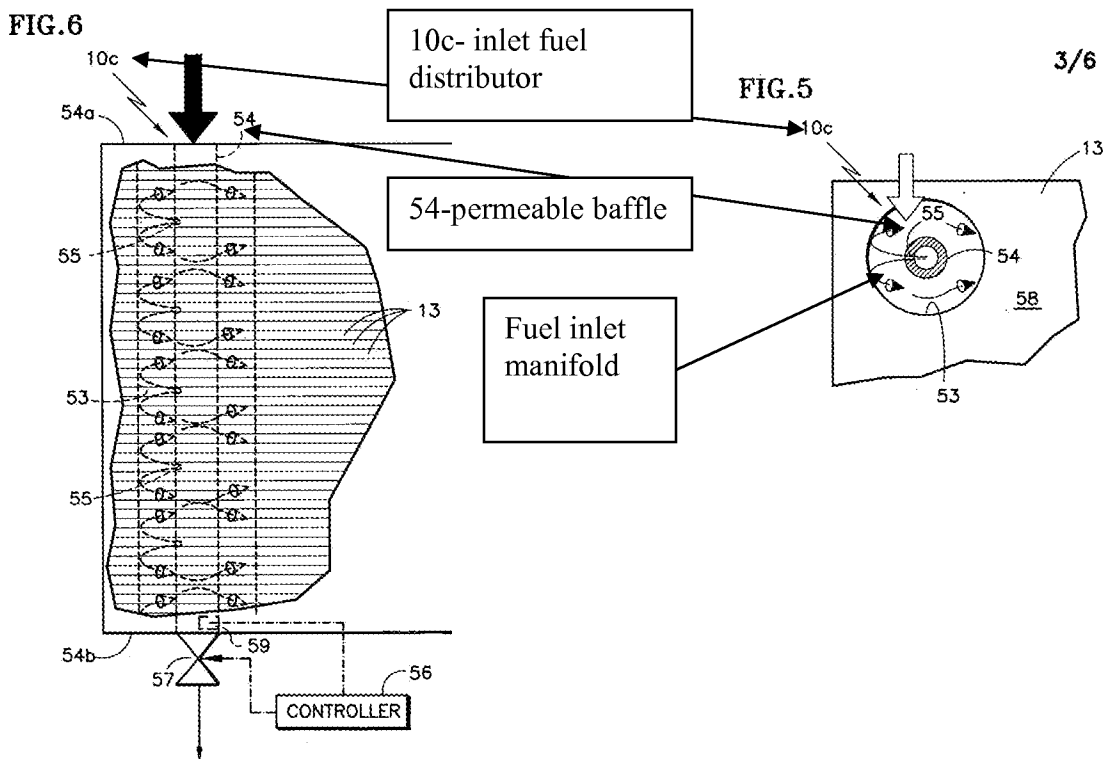
***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 14, the claim states “a recycle system for providing recycle fuel from said fuel outlets into said fuel inlet manifold downstream of said permeable baffle”. With reference to figures 5 and 6, the elected species of the fuel distributor, it is unclear how the inlet manifold is down stream of the permeable baffle (see figure below).



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The solid dark arrow indicates the inlet of fuel is in the center of the opening of the baffle (54).

The white arrow indicates the recycle fuel enters the system outside of the baffle. Since both fuels (recycled and neat) are entering at the top of the fuel cell, it is unclear how the inlet manifold (53) is down stream of the baffle (54) because the permeable baffle is concentric with the fuel inlet manifold.

For the purposes of examination, the examiner will assume there is a recycle stream which connects the fuel exiting the fuel cells and the inlet of the fuel manifold.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2, 4, 9, 12 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ketchman et al. (US 6,045,935).

With respect to claims 2, 4, and 9, Ketchman et al. discloses a fuel cell plant comprising a plurality of fuel cells (30) each fuel cell having at least one fuel flow field (gas diffusion layer)

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each fuel flow field having a fuel inlet (since gas diffuses through the layer therefor it will inherently have a fuel inlet in the gas diffusion layer), a fuel supply pipe (inherently a supply pipe must attach to the system in this case it will attach to the inlet of pipes (36 or 35)). A fuel inlet manifold in fluid communication with all of the fuel flow field inlets (the center opening in each of the cell) and an inlet fuel distributor (38) have a fuel inlet chamber interconnected with the fuel supply pipe and including a permeable baffle through which fuel is flowed into fuel inlet manifold. The permeable baffle is the perforated metal tubes (36, 35) which is a solid (metal tube) with a plurality of small orifices (perforations in the metal tube). The fuel will enter at the top of the perforated metal tube (36) and travel down the tube, then enter the perforations of the ceramic tube (38) which has porous or perforated rings (55) which act as gas diffusers causing the fuel to be uniform. (Figures 2 and 3)

With respect to claim 12, the opening of perforated metal tube (36, first internal fuel manifold receiving fuel from the fuel supply pipe) is inside perforated ceramic tube (38- a second internal fuel manifold fold providing fuel to fuel inlets of the electrodes) and which receives fuel through the perforated metal tube which is the baffle. (Figures 2 and 3).

### ***Claim Rejections - 35 USC § 103***

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchman et al. (US 6,045,935) in view of Sawyer (US 6,569,549).

With respect to claim 13, Ketchman et al. discloses a fuel cell plant comprising a plurality of fuel cells (30) each fuel cell having at least one fuel flow field (gas diffusion layer) each fuel flow field having a fuel inlet (since gas diffuses through the layer therefor it will inherently have a

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fuel inlet in the flow field), a fuel supply pipe (inherently a supply pipe must attach to the system in this case it will attach to the inlet of pipes (36 or 35)). The fuel inlet chamber is the connection between the supply pipe (inherent) and the inlet of pipe (36) which is in fluid communication with each other. Ketchman et al. fails to disclose an exhaust valve or a controller. Sawyer discloses a fuel cell stack with a fuel inlet manifold (26) and a fuel exhaust manifold.(34), a fuel exhaust valve (30), and a vent valve controller (32). The exhaust valve is in fluid communication with the fuel inlet the exhaust valve is located a distance from the inlet of the fuel and fuel supply pipe (Figure 3). A controller operating the vent valve (therefor opening or closing the valve) based on a timed schedule or the relationship of nitrogen detected by the sensor (col. 6 lines 15-21) which will purge the anode electrode flow fields and the exit manifold (col. 6 lines 28-38).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include the vent valve and controller of Sawyer to the fuel cell system of Ketchman in order to prevent the build up of impurities in the anode fields thereby increasing the operational efficiency of the fuel cell (col. 4 line 46).

10. Claims 1 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchman et al. (US 6,045,935) in view of Sawyer (US 6,569,549 B1).

Ketchman et al. discloses a fuel cell plant comprising a plurality of fuel cells (30) each fuel cell having at least one fuel flow field (gas diffusion layer) each fuel flow field having a fuel inlet (gas diffuses through the layer therefor it will inherently have a fuel inlet and fuel outlet), a fuel supply pipe (inherently a supply pipe must attach to the system in this case it will attach to the

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inlet of pipes (36 or 35)). A fuel inlet manifold in fluid communication with all of the fuel flow field inlets (the center opening in each of the cell) and an inlet fuel distributor (38) have a fuel inlet chamber interconnected with the fuel supply pipe and including a permeable baffle through which fuel is flowed into fuel inlet manifold. The permeable baffle is the perforated metal tubes (36, 35) which is a solid (metal tube) with a plurality of small orifices (perforations in the metal tube).

Ketchman fails to disclose an exhaust valve, a controller and a fuel recycle loop.

Sawyer discloses a fuel cell power plate comprising a fuel cell stack, a fuel supply pipe (pipe connecting fuel source (22) and fuel inlet manifold (26) shown in Figure 3) an exhaust valve (30), and a vent valve controller (32). The exhaust valve is in fluid communication with the fuel inlet the exhaust valve is located a distance from the inlet of the fuel and fuel supply pipe (Figure 3). A controller operating the vent valve (therefor opening or closing the valve) based on a timed schedule or the relationship of nitrogen detected by the sensor (col. 6 lines 15-21) which will purge the anode electrode flow fields and the exit manifold (col. 6 lines 28-38). A fuel recycle loop system for recycling fuel the fuel (col. 6 line 21-22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include the controller, vent valve and recycle loop of Sawyer to the system of Ketchman because the controller and vent valve will remove the impurities from the system and the recycle loop will allow for the fuel to be recycle thus increasing the efficiency of the system.

11. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchman et al. (US 6,045,935).

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Ketchman et al. discloses the fuel cell as discussed above and incorporated herein but fails to taper the permeable baffle (36) to have the inlet end have a larger opening than the outlet end in order to increase the pressure of the fuel as is well known in the art because by narrowing the tube a nozzle is formed which increases the pressure at the outlet compared to the pressure at the inlet.

It would have been obvious to one of ordinary skill at the time of the invention to taper the baffle in this manner so as to increase the pressure of the fuel toward the outlet where the amount of fuel is less than at the beginning thus insuring an equalized amount of fuel entering the fuel distributor.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA J. LAIOS whose telephone number is (571)272-9808. The examiner can normally be reached on Monday - Thursday 10 am -7 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJL

/Susy Tsang-Foster/

Supervisory Patent Examiner, Art Unit 1795